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| EXAMINER | |
|---|---|
| TORRES, JOSE | |
| ART UNIT | PAPER NUMBER |
| 2112 | |

| SHORTENED STATUTORY PERIOD OF RESPONSE | MAIL DATE | DELIVERY MODE |
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**Please find below and/or attached an Office communication concerning this application or proceeding.**

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

| Office Action Summary | Application No. | Applicant(s) | |
|---|---|---|---|
| | 10/699,728 | JACOBSEN, DANA D. | |
| | Examiner | Art Unit | |
| | Jose M. Torres | 2112 | |

*-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --*

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

1)☐ Responsive to communication(s) filed on _____.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

4)☒ Claim(s) 1-38 is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) 1-38 is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

**Application Papers**

9)☒ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on 03 November 2003 is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date 11/03/2003.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

## DETAILED ACTION

### *Specification*

1. The disclosure is objected to because of the following informalities:

- Page 3 line 2: "printing device 740" should be -- printing device 740 --
- Page 4 line 32: "Figure 2" should be -- Figure 2A --

Appropriate correction is required.

2. The specification is objected to as failing to provide proper antecedent basis for the claimed subject matter. See 37 CFR 1.75(d)(1) and MPEP § 608.01(o). Correction of the following is required:

- Claim 30 line 4: "a media marking mechanism"

Appropriate correction is required.

### *Claim Objections*

3. Claims 22 and 26 are objected to because of the following informalities:

- Claim 22 line 3: "tracking matched" should be -- tracking matches --
- Claim 26 line 4: "tracking matched" should be -- tracking matches --

Appropriate correction is required.

### *Claim Rejections - 35 USC § 101*

4. 35 U.S.C. 101 reads as follows:

> Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

5. Claim 31 is rejected under 35 U.S.C. 101 because the claimed invention is directed to non-statutory subject matter. The claim defines the means for receiving data as a set of computer executable instructions, which is functional descriptive material and can only be considered statutory when embodied on a computer readable medium so that its functionality can be realized by a computer.

### *Claim Rejections - 35 USC § 112*

6. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

7. Claims 19 and 20 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claims 19 and 20 recites the limitation "Gamma Golomb (3) code" on line 2, respectively. The term Gamma Golomb code is not properly defined in the specification of the original disclosure, therefore it has been interpreted as Golomb coding. Correction is required by the appropriate amendment.

***Claim Rejections - 35 USC § 102***

8. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

9. Claims 1-6, 9-11, 22, 25, 26 and 29 are rejected under 35 U.S.C. 102(b) as being anticipated by So et al. (U.S. 2001/0024524).

Re claim 1: So et al. disclose a method of image compression (Paragraph [0037]), comprising: tracking a pool of pixel predictors (FIG 1, "predictors **12a-e**", Paragraph [0039]); selecting a subset of pixel predictors from the tracked pool (FIG 1, "predictor determination circuit **13**", Paragraph [0041]); and rebalancing the pixel predictor subset to locally adapt to image conditions (FIG 1, "rank updating circuit **15**", Paragraph [0043]).

Re claim 2: So et al. disclose the pool of pixel predictors are assigned hit counters which are used to facilitate rebalancing ("ranking index", Paragraphs [0041] and [0043]).

Re claims 3: So et al. disclose the pool of pixel predictors are tracked in two dimensions (FIG. 4, Paragraph [0049]).

Re claims 4 and 5: So et al. disclose the pool of pixel predictors include pixel locations (FIG 4, "pixels **R0-R11**"), wherein the pixel locations include a NE (**R8**), a NEE (**R9**), a NW (**R6**), a N (**R7**), a NWW (**R5**), a W (**R11**), and a WW (**R10**) pixel location expressed geographically relative to a pixel being processed (FIG. 4, "target pixel X", Paragraph [0049]).

Re claim 6: So et al. disclose the pool of pixel predictors includes a last unmatched pixel ("error outside tolerance **105**"), a cache pixel ("recently selected approximation"), a black pixel ("mean value less than the average of the group of all peripheral pixels"), a white pixel ("mean value greater than the average of the group of all peripheral pixels") and a most common value pixel ("most frequently selected approximation", Paragraphs [0040], [0043] and [0051]).

Re claim 9: So et al. disclose incrementing a hit counter associated with each pixel predictor in the pool of pixel predictors when a match between a pixel predictor and processed pixel is found ("rank updating", Paragraph [0043]).

Re claim 10: So et al. disclose the subset of possible pixel predictors is selected based on incremented hit counters (FIG. 1, "priority technique index **106**", Paragraph [0047]).

Re claim 11: So et al. disclose using a pixel predictor from the selected subset having a highest incremented hit counter value as the first pixel predictor used for pixel predictions (FIG. 6, "maximum run length information **203**", Paragraphs [0063] and [0065]).

Re claims 22 and 26: So et al. disclose a computer readable medium having instructions for causing a device to perform a method of image compression (Paragraph [0037]), comprising: assigning a hit counter to each of a number of pixel predictor values ("ranking index", Paragraphs [0041] and [0043]); tracking matched between pixel predictor values and processed pixels in two dimensions ("comparison", Paragraph [0041]); incrementing the hit counters based on tracked prediction matches ("rank updating", Paragraph [0043]); and rebalancing the hit counters to locally adapt to image conditions (FIG 1, "rank updating circuit **15**", Paragraph [0043]).

Re claims 25 and 29: So et al. disclose specifying a number of bit limits for encoding an indicator of a run command ("Huffman coding", Paragraph [0044]); encoding a literal command ("run length", Paragraph [0044]); encoding a prediction of a next pixel ("priority technique index **106**", Paragraph [0043]); encoding a seedrow count; and encoding a replacement count ("rank/run length", Paragraphs [0044] and [0045]).

***Claim Rejections - 35 USC § 103***

10. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

11. Claims 7, 8, 12, 13, 19 and 20, as understood, are rejected under 35 U.S.C. 103(a) as being unpatentable over So et al. in view of Weinberger et al. (IEEE Transactions on Image Processing, Vol. 9, No. 8, Aug. 2000 "The LOCO-I Lossless Image Compression Algorithm: Principles and Standarization into JPEG-LS"). The teachings of So et al. have been discussed above.

However, So et al. fails to disclose the pool of pixel predictors tracked include continuous tone prediction algorithms selected form the group LOCO, MED, LINEAR 4, LINEAR 5 and GAP, each run and replacement count is encoded as variable length Gamma Golomb code, and periodically rebalancing the hit counters after a set prediction interval, and rebalancing the hit counters when a first pixel predictor in the subset exceeds a specified limit

Weinberger et al. teaches the pool of pixel predictors tracked include continuous tone prediction algorithms ("continuous-tone images", I. Introduction, page 1309) selected form the group LOCO, MED, LINEAR 4, LINEAR 5 and GAP (III. Detailed Description of JPEG-LS, and A. Prediction, page 1312) as recited in claims 7 and 8, periodically rebalancing the hit counters after a set prediction interval when a first pixel predictor in the subset exceeds a specified limit (III. Detailed Description of JPEG-LS,

D. Resets, pages 1316-1317) as recited in claims 12 and 13 and each run count and replacement count is encoded as variable length Gamma Golomb code (II. Modeling Principles and LOCO-I, B. Application to LOCO-I, Coder, page 1311) as recited in claims 19 and 20.

Therefore, in view of Weinberger et al., it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify So et al.'s system by including the LOCO continuous tone prediction algorithm, periodically resetting the counts by halving its content each time a count attains a predetermined threshold, and coding the run lengths and replacement counts using a Golomb variable length encoding technique in order to give the immediate past a larger weight than the remote past and attain compression ratios similar or superior to those obtained with state-of-the-art schemes based on arithmetic coding.

12. Claims 14-18, 21, 23, 24, 27 and 28 are rejected under 35 U.S.C. 103(a) as being unpatentable over So et al. in view of Takaoka et al. (U.S. 6,157,676). The teachings of So et al. have been discussed above.

So et al. further teaches a method of image compression (Paragraph [0037]), comprising: assigning a hit counter to each of a number of pixel predictors, each pixel predictor having one of the pixel prediction values ("ranking index", Paragraphs [0041] and [0043]); tracking matches between pixel predictor values and a number of processed pixels in two dimensions ("comparison", Paragraph [0041]); incrementing the hit counters based on tracked prediction matches ("rank updating", Paragraph [0043]);

and selecting a number of pixel predictors having the highest hit counters for future pixel predictions (FIG. 6, "maximum run length information **203**", Paragraphs [0063] and [0065]) as recited in claim 14, the method further comprises: storing the incremented hit counters in a bit packing mechanism; and storing a number of run counts and replacement counts as variable length ("Huffman coding", Paragraph [0044]) as recited in claim 15, a single bit is encoded to indicate a run command and a literal command ("rank/run length coding", Paragraph [0044]) as recited in claims 16 and 17, each pixel predictor includes a pixel predictor location that is unary coded (Paragraph [0049] and [0056]) as recited in claim 18, and encoding a last unmatched pixel prediction verbatim ("approximation technique", Paragraph [0043]) as recited in claim 21.

However, So et al. fails to disclose communicating a number or pixel prediction values via variable length code compression algorithm.

Takaoka et al. teaches communicating a number or pixel prediction values via variable length/fixed-bit code compression algorithm (Col. 11 lines 47-56 and Col. 14 line 1-13) as recited in claims 14, 23, 24, 27 and 28.

Therefore, in view of Takaoka et al., it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify So et al.'s system by including the method step of encoding the pixel values using variable length encoding or a fixed-bit encoding and transferring the prediction values to the prediction determination circuit in order to provide higher encoding efficiency to an image minimizing the coding error between pixels blocks.

13. Claims 30-35 are rejected under 35 U.S.C. 103(a) as being unpatentable over So et al. in view of Sriram et al. (U.S. 6,654,419).

So et al. teaches an image forming system (FIG.1, Paragraph [0037]), comprising: means for two-dimensional image compression/decompression with pixel predictor rebalancing (Paragraphs [0038] and [0039]) as recited in claim 30, the means for receiving image data includes a set of computer executable instructions operable on an image file format (Paragraph [0098]) as recited in claim 31, and the means for image file compression/decompression includes a set of computer executable instructions for two-dimensional compression/decompression with dynamic pixel predictor rebalancing (Paragraphs [0043], [0044] and [0098]) as recited in claim 33.

So et al. further teaches an image compression device (FIG.1, Paragraph [0037]), comprising: logic on the device to conduct two-dimensional image compression with a number of pixel predictors (Paragraphs [0043], [0044] and [0098]) as recited in claim 34, and the device include a number of hit counters, each associated with a different pixel predictor, the hit counters operable to be incremented when a match between a pixel predictor and a processed pixel is found ("rank updating", Paragraph [0043]) as recited in claim 35.

However, So et al. fails to disclose a processor, a memory, a media marking mechanism, interface electronics coupling the processor, the memory, and the media marking mechanism, means for receiving compressed image data including an I/O connection/port to send and receive image data and a compression module coupled to the processor and the memory.

Sriram et al. teaches an imaging forming system (FIG. 8, "computer system **200**", Col 15 lines 64-65), comprising: a processor ("processor **210**"); a memory ("main memory **212**"); a media marking mechanism ("storage device **216**"); interface electronics ("bus **208**") coupling the processor, the memory, and the media marking mechanism (Col. 15 line 64 through Col. 16 line 33); means for receiving compressed image data ("communication interface **224**", Col. 17 lines 21-25) as recited in claim 30, the means for receiving image data includes an I/O connection to send and receive image data ("communication interface **224**", Col. 17 lines 21-25) as recited in claim 32, and an image compression device (FIG. 8, "computer system **200**", Col 15 lines 64-65), comprising: a processor ("processor **210**"); a memory operably coupled to the processor ("main memory **212**"); a compression module coupled to the processor and the memory ("processor **210**"); an I/0 port to send and receive data coupled to the processor and the memory ("communication interface **224**", Col. 15 line 64 through Col. 16 line 33 and Col. 17 lines 21-25) as recited in claim 34.

Therefore, in view of Sriram et al., it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify So et al.'s system by including a processor, a main memory, a storage device, a bus, and a communications interface in order to reduce the time required for processing an image, and increase the throughput of processing pixel values for one or more images.

Claim 30 invokes 35 U.S.C. 112 sixth paragraph.

14. Claims 36 and 37 are rejected under 35 U.S.C. 103(a) as being unpatentable over So et al. in view of Sriram et al. as applied to claim 35 above, and further in view of Weinberger et al. The teachings of So et al. modified by Sriram et al. have been discussed above.

However, So et al. modified by Sriram et al. fails to disclose at least one hit counter can be periodically reset and each hit counter has a total wherein the total can be reset by dividing the total by a power of two.

Weinberger et al. teaches at least one hit counter can be periodically reset and each hit counter has a total and wherein the total can be reset by dividing the total by a power of two (III. Detailed Description of JPEG-LS, D. Resets, pages 1316-1317) as recited in claims 36-37.

Therefore, in view of Weinberger et al., it would have been obvious to one of ordinary skill in the art at the time the invention was made to further modify So et al. and Sriram et al. by periodically resetting one hit counter by halving its content in order to give the immediate past a larger weight than the remote past.

15. Claim 38 is rejected under 35 U.S.C. 103(a) as being unpatentable over So et al. in view of Sriram et al. as applied to claim 34 above, and further in view of Takaoka et al. The teachings of So et al. modified by Sriram et al. have been discussed above.

However, So et al. modified by Sriram et al. fails to disclose the number of pixel predictors are selected from the group including a number of set of pixel values and a number of compression algorithms.

Takaoka et al. teaches the number of pixel predictors are selected from the group including a number of set of pixel values and a number of compression algorithms (Col. 11 lines 47-56).

Therefore, in view of Takaoka et al., it would have been obvious to one of ordinary skill in the art at the time the invention was made to further modify So et al. and Sriram et al. by including the pixel predictor values selected from pixel values and compression algorithms to the prediction determination circuit in order to provide higher encoding efficiency to an image minimizing the coding error between pixels blocks.

***Conclusion***

16. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Leon et al. disclose An Evolvable Predictor for Lossless Image Compression, Cok disclose a Pixel Value Estimation Technique Using Non-Linear Prediction, Sapiro et al. disclose an Image Compression System Including Encoder Having Run Mode, Yokose et al. disclose an Image Encoding System, Image Decoding System and Methods Thereof, and Bossen et al. disclose an Image Processing Apparatus Utilizing Pixel Values of Peripheral Pixels Adjacent the Subject Pixel.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jose M. Torres whose telephone number is 571-270-1356. The examiner can normally be reached on Monday thru Friday: 8:00am - 4:00pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jong-Suk (James) Lee can be reached on 571-272-7044. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

JMT
01/05/2007

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